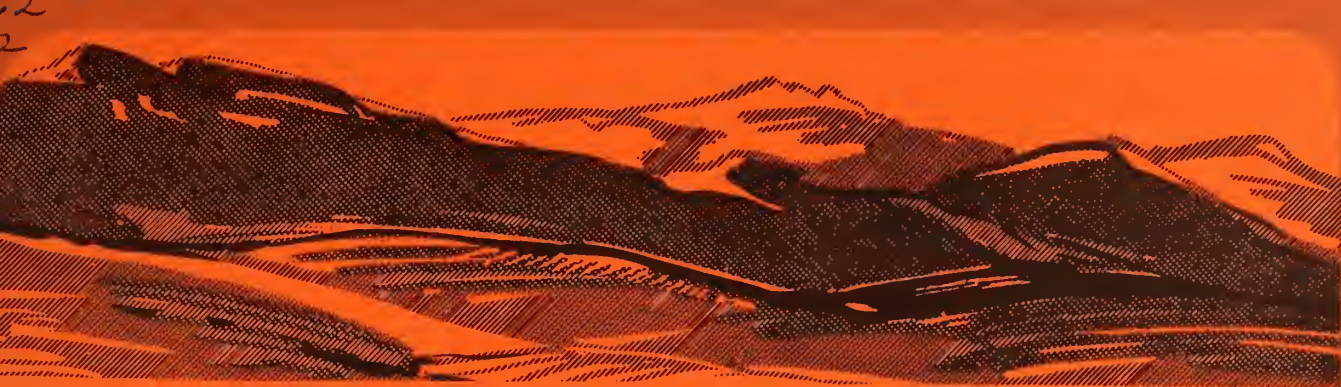


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RANGE IMPROVEMENT



VOL. 14, NO. 4

NOTES

OCTOBER 1969

INDEX

Weed Control-Research, Teaching and Extension	1
Relation of Sage Grouse to Upland Meadows	11

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STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "NOTES" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

WEED CONTROL --RESEARCH, TEACHING, AND EXTENSION

By

Glenn C. Klingman*

It is a pleasure to be here and share some of my thoughts concerning "Weed Control--Research, Teaching, and Extension." First let me share a bit of personal philosophy. When I go to a doctor's office, I go because he is a doctor. I'm not particularly interested in his politics, religion, his knowledge of mathematics, history, foreign languages, nuclear physics, etc., I go because I believe that he has some knowledge of human physiology, anatomy, biochemistry and pathology. My judge of him as a doctor is based on how he uses these bits of knowledge to solve my particular problem. Similar analogies can be made for the engineer, the artist, the economist, etc. It is my opinion that the professionally trained agriculturist should also know the physiology, the biochemistry, the ecology, the economics, etc., that directly affect agriculture. When we segment agriculture and come to that segment with which we are concerned today, it is my contention that a "Professional Weed Control" individual must also be trained in those subjects which bear directly on his professional effectiveness. Later, I will return to those segments which I consider of utmost importance. Now, I would momentarily direct our thinking along slightly different but related topics.

My concern centers on two closely related problems:

1. The safety of pesticides when used according to recommendations - and the almost complete lack of understanding on this on the part of the public, and
2. the need for these products in a maximum food production program.

My concern has developed through the past 25 years as a college professor doing teaching and research in the area of Weed Control. As you may know, I retired from North Carolina State University two years ago. My concern has continued to grow in my present position as Director of Plant Science at the Ely Lilly Company. This position includes direction of both research and development work in the areas of Entomology, Plant Pathology, Herbicides, and Plant Growth Regulators. Now, as President of the Weed Science of America my concern is brought into even more clear focus.

*Excerpts from a speech presented at the Idaho Weed Control Conference, McCall, Idaho, July 23, 1969, by Glenn C. Klingman, Director of Plant Science, Eli Lilly and Company, Greenfield, Indiana.

Therefore, I hope that you will accept my thoughts as not necessarily the thoughts of Eli Lilly and Company, but the thoughts of a retired College Professor, an Industrial Research Representative, and as the President of the Weed Science Society of America.

PESTICIDES--AND THE ROAD AHEAD

To better understand the road ahead let's take a quick look to the rear. If increased sales over the previous year is indicative of trends, we find that in 1962 we used 14.3% more pesticides than in 1961, 6.6% more in 1963 than in 1962, etc. There has been an average growth rate each year over the preceding year of just less than 20% during this 6-year period.

What is the relative importance of fungicides, insecticides, and herbicides? One measure is the amount that farmers pay for such chemicals. In 1967 herbicide sales constituted 55% of the total sales, insecticides 38%, and fungicides 7%. More acreage is now being treated with herbicides than the combined acreage treated with both insecticides and fungicides.

Why this rapid increase in the use of herbicides? I suspect we could list many things such as labor shortages, increased acreage per farm, and a whole host of new effective, and safe herbicides. I suspect that probably the most important item relates to crop yields. Often the farmer was not able, previously, to do an effective job of weed control. By harvest time his crop was heavily infested with weeds. By using the right herbicides all this changed. In a summary of 19 experiments, randomly taken in soybeans, under farm conditions, the use of TREFLAN increased the soybean yields by over 30%. It is not difficult to find similar data for almost every crop--as produced under regular farm conditions.

Where is all of this leading us? Are we truly heading for a "Silent Spring"? Following the fears aroused by Silent Spring a multi-million dollar monitoring program has been developed. It is true that there are a few warning signals that must not be ignored. The insecticide DDT is the principal pesticide that is being found. Persistent materials that cause environmental contamination, such as DDT, must be reduced and replaced by materials without this liability. However, we should also recognize that DDT has saved more human lives, for example through malaria control, than any medicine yet produced. For example, up to and through 1963 DDT was widely used in Ceylon for the control of malaria transmitting mosquitoes. In 1963, the number of malaria cases had been cut down to 19. Then, the use of DDT was stopped, and other control programs were relaxed. By 1968 the number of malaria cases rose to 2 million out of 11 million people. Human deaths caused by DDT are almost unheard of. But, let's accept these signals of danger through accumulation in certain food chains and act accordingly.

In the area of herbicides and fungicides there is no evidence that these are accumulating in the bodies of man, animals, wildlife, fish, waters, or in our soils.

Few critics of pesticides understand the safety procedures that are now built into the development and registration of a new pesticide. The chart on the following page shows a typical commercial Research and Development Program of a new pesticide. It is obvious that it takes a considerable amount of time and money to develop a new pesticide. At the end of 6 years 4 million dollars have been spent - and they have not yet sold their first pound of material. It is customary to see materials dropped from further development at every stage.

Suppose you are developing this new pesticide. You must know that your new pesticide will work in the hands of the farmer under hundreds of different soil, climatic, crop and weed conditions. In addition you must convince regulatory officials that you have a safe and effective new product. There are four important areas: Agriculture, Public Health, Conservation and Food Safety. Failure to have the right data to convince any one of these individuals that the product has adequate safety and that it effectively does what you claim for it - is adequate reason for disapproval. This is as it should be. Yet, if in the beginning we had applied the same stringent restrictions to the electric light bulb, and to the radio with its radio waves, it is doubtful if we would have them today. In the beginning, how could you guarantee what a lifetime exposure to this artificial light ray or this radio wave would do? Had we needed approval for the sun's rays, it is doubtful that we could have obtained approval. In excessive doses, as you know, the sun does cause skin cancer and it is thus a carcinogen.

A serious problem exists today where an individual knows one small scientific segment, but seems to be oblivious of all other factors that bear on the subject. Under such conditions it is easy for such an individual to make false analogies and false associations. From the graph on page 5 we see that the annual deer harvest has increased through the years of dramatically increased use of pesticides. We could falsely generalize that pesticides have favored deer. Further, we could say that pesticides have been more favorable to white tailed deer than to mule deer. We could do the same with the mourning dove population, and for that matter with many other bird species as reported by the Audubon Society.

In general, we are apt to assume that all pollution is bad and readily accept statements that wildlife and fish are casualties of pollution. While I certainly don't favor pollution of Lake Michigan, it is apparent that pollution from the cities on Lake Michigan tend to fertilize and favor microscopic plant life which in turn provides food for the Coho salmon. The well fed Coho salmon of Lake Michigan grow to 10-12 pounds in 18 months, compared to 4 pounds in the less polluted Lake Superior.

A Typical Research and Development Program Agricultural Chemical Manufacturer

TIME

From planned synthesis of new structures, plus numerous intermediates of chemical manufacturing come candidate pesticides.

The larger manufacturers routinely screen these chemicals for biological and pesticidal activity—on plants, seeds, insects, fungi, fish, birds, and mammals.

From among some 4,000 candidate chemicals only about 40 merit further study after the above screening tests. The data from the other 3,960 compounds are filed for future reference.

More extensive laboratory, greenhouse, and small field plot tests using larger numbers of plant and animal species, reduce the 40 candidates to one or two.

Introductory field studies on the manufacturer's own farms at several locations about the United States will require a minimum of two years' study.

Concurrently as the most promising compounds emerge three important programs must be undertaken.

Chemical process research and pilot plant production.

Chemical analytical techniques must be developed to detect residues in treated crops.

A 2-year feeding toxicity study on two or more species of animals at several dosage levels—a study costing in the neighborhood of \$100,000.

The pesticide under investigation is now offered to Government laboratories and agricultural experiment stations for independent evaluation.

Chemical studies including the identification of metabolites and the fate in the environment.

If the data are still favorable then application is made to the USDA Pesticides Regulation Division for a temporary permit (1-year) to allow field trials under a variety of geographic and faunal conditions.

Finally, armed with 5-8 years of cumulative studies, the one compound out of the initial 4,000 that has survived is presented for registration. It has taken a combined effort of chemists, agricultural scientists, toxicologists, and environmental biologists.

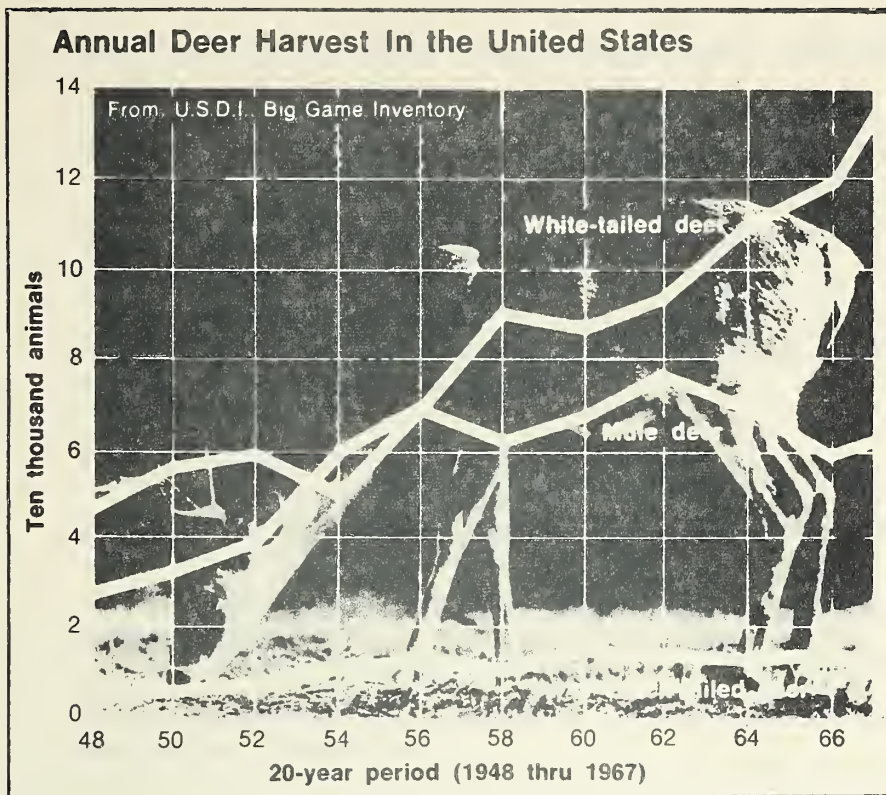
COSTS

\$500,000

\$1,000,000

\$2,000,000

\$4,000,000



While I am on the subject of making false associations, here is a bit of nonsense that rather pleasantly identifies the problem. Let me again remind you that what follows is all in jest and I have no quarrel with the pickle industry.

LOGIC - AS USED BY SOME WRITERS

PICKLES WILL KILL YOU! Every pickle you eat brings you nearer to death!

Amazingly, most thinking people have failed to grasp the terrifying significance of the term "in a pickle."

Although leading horticulturists have long known that *Cucumis sativus* possesses an indehiscent pepo, the money grabbing pickle industry continues to expand.

Pickles are associated with all major diseases of the body. Eating of them breeds wars and Communism. They can be related to most airline tragedies. Auto accidents are caused by pickles. There exists a positive relationship between crime waves and the consumption of this fruit of the cucurbit family. For example, recent surveys have shown:

- Nearly all sick people have eaten pickles. The effects are obviously accumulative.
- 99.9% of all people who die from cancer have eaten pickles.
- Have you had more pains and aches lately - you have probably recently eaten pickles.
- pickles are associated with pregnancy. Nearly all pregnant women crave this bitter fruit.
- 100% of all soldiers have eaten pickles.
- 96.8% of all Russian sympathizers have eaten pickles.
- 99.7% of the people involved in air and auto accidents consumed pickles within 14 days preceding the crash.
- 93.1% of juvenile delinquents come from homes where pickles are served frequently.

Perhaps you need evidence of a long-term nature:

- Of the people born in the 1849 who later dined on this vegetable, there has been 100% mortality.
- All pickle eaters born between 1859 and 1869 have wrinkled skin, lost most of their teeth, brittle bones, and failing eyesight - if the ills of eating pickles has not already caused their death.
- Even more convincing is the report of a noted team of medical specialists - Rats forced fed with 20 pounds of pickles per day for 30 days develop bulging abdomens. Their appetite for **WHOLESOME FOOD** is destroyed.

If you are a skeptic, try this experiment: buy 5 quarts of pickles from your neighborhood grocer. (You'll be shocked to learn this dangerous food is available to everyone and actually on sale near your place of worship.) Grind the contents to a pulp and place in a bowl. Drop in one live guppy. It will die within four hours.

I'm not against pickles - just the eating of pickles !!!!!

In spite of all these ills the money hungry pickle growers and pickle packers spread their evil. More than 120,000 acres of fertile U.S. soil are now devoted to the production of the evil cucumber, and our per capita consumption is nearly 4 pounds.

Eat orchid petal soup. Practically no one has problems from eating orchid petal soup compared to those of pickle eaters.

IF THIS SOUNDS RIDICULOUS, COMPARE IT WITH THE LOGIC USED BY PESTICIDE FEAR MONGERS, ORGANIC GARDENERS, AND OTHER SELF-STYLED SCIENTISTS. ALL MAKE USE OF INDISCRIMINATE GUILT THROUGH ASSOCIATION. ALSO, THE DATA MAY BE CORRECTLY QUOTED, BUT THE ANALOGIES OR COMPARISONS MAY BE WRONG OR COMPLETELY MISLEADING.

So much for the nonsense!

WHAT THEN OF THE ROAD AHEAD?

What are our alternatives?

What are our problems?

FIRST OUR PROBLEMS:

You have all heard of the population explosion and the problems of feeding this population. It has been said that it is easy for a well-fed nation to look at statistics of starvation and go to sleep - without giving as much as a healthy belch. For us, it will not be easy. Television sits in our living room, and it will show mass starvation and death before our very eyes. We cannot avoid the fundamental trouble we are moving into, the trouble, which in truth, we are already in. Many minds, especially of youth, are already in a state of siege. Problems of the rich vs. the poor; the well-fed vs. the hungry; the have-nations vs. the have-nots; Capitalism vs. Communism. Our problems are real - and present communication systems will keep the pot boiling.

Population control techniques, even under the most optimistic appraisals, cannot stop serious starvation problems from occurring. If we use every technique at our disposal to increase food supplies, we may be able to handle the food problem for the next 10 to 20 years. But to do this we will have to maximize the use of new crop varieties, better soil fertility, and better pest control techniques including better rodenticides. We must change our attitude toward increasing food production - not toward trying to reduce food production.

Industry has become a major force in Agricultural Research. Recent estimates indicate that industry is spending about \$400 million annually for Agricultural Research. In comparison, the Federal and State governments spend together about \$326 million. We must continue to examine the expenditures and make sure that old programs that are no longer needed are dropped - and that meaningful new programs are added. It is no time for "Status Quo" to prevail.

With time we can expect that there will be fewer and fewer farmers. We should be careful of this trap, however, when we think that there will be less and less need for technical assistance for the farmer. We must remember that our needs for food continue to increase. We are completely dependent upon the competence of the technical assistance available to the farmer. Extension agents and Agricultural Education teachers, or as I used to know them - County Agents and Vocational Education teachers, have a tremendous challenge ahead. They must be "experts" from all the Agricultural disciplines. There will likely need to be teams serving specific agricultural areas. This framework would tremendously increase the farmers safe use of pesticides. If the Extension Administrations and the Agricultural Education Administrators fail in meeting this challenge, the future of these services to agriculture appears bleak, indeed. I apologize if this comes through as a threat; however, if these Educational Services fail, then industry will have no choice but to fill this void in its own way.

I hasten to add that I have always been, and still am, a strong supporter of the Agricultural Extension Service, Vocational Education, and the Conservation Service. My wife's father was a County Agent, later to become a Statewide Extension Coordinator. I have a brother still in the Conservation Service, another brother who worked in Agricultural Education, and two other brothers that are still making their living from farming. I believe that the Extension Service as an Educational Arm for a productive Agricultural Experiment Station is basic to the continued health of our Agriculture. The continued health of this arrangement is vital to a continuing supply of food for our people. It is hoped that enough flexibility remains within these organizations to meet their present challenges.

ALTERNATIVES:

Next - what are our alternatives as far as pesticides and their contribution to the total food production picture? In the area of Insecticides there are many new things coming. We have learned to use many new techniques ranging from biological control, attractants, lights, to radio activity and chemically sterilizing insects so that they produce no offspring. In spite of all this new sophistication, chemical insecticides have remained the backbone of Insect Control programs. I see no change in the foreseeable future, other than for new and improved insecticides including perhaps new approaches in the form of hormones. There will be greater use of biological control techniques along with new and improved insecticides. We will see a gradual shift from the more persistent insecticides - even though I seriously question many of the charges that are being recklessly made against their use.

FUNGICIDES:

Few changes have occurred in the control of diseases in recent years. In 1964 sulfur constituted 80% of the total poundage of fungicides applied in

the United States. As plant breeders produce new resistant crop varieties, nature produces new strains of diseases that can attack these new varieties. Rather than a single mode of attack on the disease problem, we should be using every reasonable method that is available to us. New fungicides now being developed should help in this total battle.

HERBICIDES:

We are spraying more acreage with herbicides than the combined acreage treated with insecticides and fungicides. We are rapidly becoming more and more sophisticated in this area. Industry is tremendously aware of these new developments. The Agricultural Research Service of the USDA is very much aware of these trends. Farmers are very much aware. The only people, and may I say very important people, that have not discovered herbicides are most Deans of Colleges of Agriculture and Directors of Agricultural Experiment Stations. There is not a single Department of Weed Science in the Nation - compared to almost every State Agricultural Experiment Station having both an Entomology Department and a Plant Pathology Department. Here in Idaho, if my count is correct there are 16 professional Entomologists, 14 professional Plant Pathologists, and 3 Weed Control Researchers and Teachers, and one Extension Specialist. Don't misunderstand me. I would not under-rate the importance of the Entomologist and Plant Pathologist. However, I am equally convinced that there should be Weed Science Departments.

Time will permit me to only list a few of the reasons that we need departments of Weed Science - or some other definite organizational arrangement to handle this new science:

1. We need better training at every level - for the 2-year and 4-year programs and in graduate programs.
2. We need an unbiased group to look after the farmers' interest. For the farmer, all the reasons exist for researching and teaching this new science that originally prompted the formation of Animal Science, Crop Science, Soils, Entomology, and Plant Pathology Departments.
3. Such a research group is especially well adapted to:
 - a. Study combination chemical treatments involving several chemical companies' products.
 - b. Study chemical and crop rotation systems to reduce residue hazards.
 - c. To develop entirely new crop production systems such as stubble mulch planting and sod planting.

- d. To help advise and guide legislation as it is needed and where it is needed.

If you agree, talk to your Dean and your Director of the Agricultural Experiment Station, The Director of Resident Instruction, and the Director of your Extension Service.

IN SUMMATION:

Agricultural Science, and especially the science of pesticide usage, is almost always related to the food supply and standard of living of a country.

Almost everything in life can be related to a calculated risk. We must weigh all the advantages against all the disadvantages. The future use of pesticides has to be decided on this basis. We have reason to be proud of the accomplishments of the past 25 years - with only minor blemishes on the record. It would appear that we can work toward the elimination of these blemishes. However, I see nothing that would indicate that we can, or that we should even try to do without pesticides. We will need well trained individuals who truly qualify as Professional Weed Control Scientists to guide these programs through the years to come. These individuals must understand plant and/or livestock production, know the chemistry and biochemistry, physiology, soils, ecology, taxonomy, microbiology, genetics and economics of the area with which they are concerned. It is my hope that we can immediately start training programs and research programs to truly develop Professional Weed Science people.

* * * * *

It's up to EACH OF US to work SAFELY.

* * * * *

The only exercise some people get
is
jumping at conclusions.

THE DUDE RANCHER

Summer 1969

RELATION OF SAGE GROUSE TO UPLAND MEADOWS

By

David E. Savage

The following is abstracted from Nevada Job Completion Report W-39-R-9 "Relation of Sage Grouse to Upland Meadows" by David E. Savage. The study was carried on in three areas in western Nevada.

A number of studies have been made of sage grouse, Centrocercus urophasianus, but the upland meadow portion of the bird's habitat had not previously been studied in detail. Observations and field survey records showed a gradual decline of sage grouse populations in areas where meadows have deteriorated or have been completely eliminated. This study indicates that meadows play an important part in the maintenance and survival of sage grouse.

Use of the meadow area by sage grouse is stimulated by the desiccation of vegetation in the sagebrush type in the spring and early summer. The use is almost exclusively by hens and young birds. Most of the cocks remained in the sagebrush cover. Migration routes often follow drainages once occupied by a meadow type. The few remaining succulent forbs present in the sagebrush are found in these lower drainages.

The sage grouse soon establish a definite pattern of use. Birds appear on the meadows shortly after sunrise, feed on the vegetation up to the water source, drink, feed again and then return to the sagebrush along the meadow edge to loaf. About an hour before sunset a similar pattern of use occurs. After the evening visit to the meadow, the birds move to ridges above the meadow to roost. As the summer progresses, the birds congregate and form large flocks. This suggests that meadows serve as a preliminary flocking area prior to winter migration.

The major attraction of the meadow was food and water. Of the plant food species, the dandelion, Taraxacum officinale, was the most preferred. Other favorite plants were Aster occidentalis, Achillea lanulosa, Artemisia tridentata and Chrysothamnus viscidiflorus lanceolatus. The younger birds utilized the ant, Formica fusca, and lady beetles, Hippodamea convergens as an important source of animal food. Two associated features of a meadow that are especially attractive to the sage grouse are a good vegetative ground cover leading to the water supply and free water not confined to deep gullies. Bare portions of the meadows or water sources lacking the desired cover approaches were not used.

In addition to sage grouse, numerous species of birds and mammals use the upland meadow. Undoubtedly this area is just as important to these animals as it is to sage grouse and requires due coordinating considerations in management planning.

*Taken from RANGE AND WILDLIFE ABSTRACTS - Rocky Mountain Region, July 22, 1969.

ORIGINAL ARTICLES

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION
PUBLISHED WEEKLY
CHICAGO, ILL., MAY 1, 1919

THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION
PUBLISHED WEEKLY
CHICAGO, ILL., MAY 1, 1919

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